CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO.

CLOSURE WASTE DISCHARGE REQUIREMENTS
FOR
MERIDIAN BEARTRACK COMPANY
MERIDIAN GOLD COMPANY
AND FELIX MINING COMPANY
ROYAL MOUNTAIN KING MINE
CALAVERAS COUNTY

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Regional Water Board) finds that:

1. The Royal Mountain King Mine (RMKM), operated by Meridian Beartrack Company and Meridian Gold Company, with landowner Felix Mining Company, (hereafter jointly Discharger), was originally regulated by Waste Discharge Requirements (WDRs) Order No. 88-176, which addressed the removal, transport, processing, and disposal of mined material. Since mining ceased, two WDRs were adopted for the closure of this site: WDRs Order Nos. 97-165 and 5-01-040. This Order rescinds and replaces Order No. 5-01-040.

2. Royal Mountain King Mine is west of Highway 4 and south of Rock Creek Road near the town of Copperopolis, Calaveras County, in Sections 18, 19, 20, 24, 29, 30, and 32, T2N, R12E, MDB&M, as shown in Attachment A, which is incorporated herein and made part of this Order by reference.

3. The Discharger operated the facility for the mining and extraction of gold. Ore was mined from a series of open pits (North, Skyrocket, and Gold Knoll) and milled at approximately 3,400 tons per day. Active mining began in March 1989 and ceased in June 1994. Mining facilities consisted of three open pits, a mill, a Flotation Tailings Disposal Area (FTR), a Leached Concentrate Residues Disposal Area (LCRF), a Process Water Retention Pond (PWP), overburden disposal sites (ODSs), and a low-grade ore storage area. The Discharger also constructed a cyanide heap leach facility within the LCRF to process low-grade oxide ore. Attachment B is a site map showing the locations of these units, and is incorporated herein and made part of this Order by reference.

4. Seven of the RMK facilities were classified as mining waste management units (WMUs) and were classified as containing either a Group A, B or C mining waste. The following are the definition of these waste classifications per the California Code of Regulations Title 27 (Title 27) Section 22480:

   "**Group A** — mining wastes of Group A are wastes that must be managed as hazardous waste pursuant to Chapter 11 of Division 4.5, of Title 22 of this code, provided the RWQCB finds that such mining wastes pose a significant threat to water quality;

Group B — mining waste of Group B are either:
(A) mining wastes that consist of or contain hazardous wastes, that qualify for a variance under Chapter 11 of Division 4.5, of Title 22 of this code, provided that the RWQCB finds that such mining wastes pose a low risk to water quality; or
(B) mining wastes that consist of or contain nonhazardous soluble pollutants of concentrations which exceed water quality objectives for, or could cause, degradation of waters of the state; or

Group C — mining wastes from Group C are wastes from which any discharge would be in compliance with the applicable water quality control plan, including water quality objectives other than turbidity."

5. The table below shows the WMU classifications from the previous WDRs. These classifications are carried over to this Order. However, these WDRs change the classification for Skyrocket Pit from a Group C to a Group B WMU, because it is now accepting Group B mining waste from other units. A description of each WMU and more details on waste characterization are found in the individual site section findings in these WDRs.

Waste Management Unit	Mining Waste Classification	Description
Leached Concentrate Residues Disposal Area	B	Heap leachate facility that contains cyanide, salts and metals.
Process Water Retention Pond	B	This unit contains water from the LCRF
Flotation Tailings Reservior	C & B	The solids were classified as Group C mining waste based on acid generation. The liquid from the unit was classified as B based on salt load and elevated metals.
Sky Rocket Pit	B	This WMU is being reclassified as a Group B mining unit because it is receiving Group B liquid waste from the ODSs and previously received liquid wastewater from the FTR.
Gold Knoll ODS	B	Elevated salts and metals.
Western ODS	B	Elevated salts and metals.
FTR ODS	B	Elevated salts and metals.

6. These WDRs require the closure of RMKM per Title 27. The LCRF is closed per Title 27 and with the adoption of these WDRs the PWP will have an approved closure plan. None of the other WMUs have a final Title 27 closure or an approved plan. These units are either very large or have other circumstances that

makes the required prescriptive Title 27 closure difficult. Title 27 allows for an Engineered Alternative per Section 20080(b) of the regulations. The engineered alternative must meet the Title 27 performance standards for closure (i.e., no threat to water quality). These WDRs require the Discharger to submit an engineered alternative for closure of the entire site. The engineered alternatives may include other regulatory mechanisms for closure, such as a release to surface water under an NPDES permit, a groundwater containment zone (per State Water Resources Control Board Resolution No. 92-49), and/or a Basin Plan Amendment to de-designate beneficial uses of the groundwater or surface water.

REGULATORY HISTORY

7. The Discharger was originally regulated by WDRs Order No. 88-176, which addressed the removal, transport, processing, and disposal of mined material. Subsequent WDRs dealt with changes in individual units or operations. WDRs Order No. 90-188 included an expansion of the FTR. WDRs Order No. 91-078 included the modification of the LCRF to include a heap leach facility. WDRs Order No 91-195 approved a one-time processing of 5,000 tons of ore from an off-site location, implemented the new Article 5 of Chapter 15 [now Title 27], and updated findings regarding facility performance and operation. WDRs Order No. 94-209 incorporated the treatment and transfer of wastewater from the PWP/LCRF into the FTR. FTR wastewater treatment and subsequent transfer to Skyrocket Pit was also approved. Monitoring and Reporting Program (MRP) Order 94-209 was amended in October 1995 to reflect the evaluation monitoring and corrective action of the FTR. WDRs Order No. 97-084 prescribed closure requirements for all the WMUs at the facility, while Order No. 97-165 incorporated closure and post-closure maintenance and monitoring for the entire facility.

8. On 4 August 1994, the Regional Water Board adopted Administrative Civil Liability Order No. 94-210 for the discharge of treated wastewater from the PWP to the FTR. This was a violation of WDRs Order No. 91-195. The discharge occurred during the period from 18 January 1993 to 18 February 1993 (a period of 28 days) and totaled 4.6 million gallons (14 acre-feet) of treated wastewater. The Discharger was ordered to pay $40,000.

9. On 15 March 2001, the Regional Water Board adopted WDRs Order No. 5-01-040. The previous WDRs, Order No. 97-165, had classified the West, Gold Knoll, and Flotation Tailings Reservoir overburden disposal sites (ODSs) as Group C mining waste. Based on impacts to surface water and groundwater from these ODSs, WDRs Order No. 5-01-040 reclassified the ODSs as Group B mining waste and required that closure of the ODSs comply with Title 27 requirements.

10. On 15 March 2001, the Regional Water Board adopted Cease and Desist Order (CDO) No. 5-01-041 as a companion order to WDRs Order No. 5-01-040. The CDO required that the Discharger cease discharges to surface water, close the ODSs, and comply with financial assurance requirements. The Discharger

petitioned the CDO to the State Water Resources Control Board (State Water Board) in a letter dated 16 April 2001. The State Water Board subsequently approved the Discharger's request for stay of CDO No. 5-01-041.

11. On 25 April 2003, the Regional Water Board adopted Revised CDO No. 5-03-0055. This CDO required compliance with WDRs Order No. 5-01-041. The requirements in this CDO were similar to the previous CDO, including requiring Title 27 closure of the ODSs, cessation of discharges to surface waters, and establishment of financial assurances. The Discharger also petitioned this Order to the State Water Board.

12. On 20 May 2004, the State Water Board adopted Water Quality Order (WQO) No. 2004-0007, which vacated the Revised CDO and required the Regional Water Board and the Discharger to consider a number of actions. These WDRs implement the findings and conclusions from this Order as described in detail in the attached Information Sheet.

13. Time Schedule Order (TSO) No. R5-2006-0900 and TSO No. R5-2007-0900 were adopted to allow the temporary discharge of wastewater from the ODSs into Skyrocket Pit, and the subsequent discharge to Littlejohns Creek.

14. The Discharger has recently applied for a National Pollution Discharge Elimination System (NPDES) permit, which will be considered by the Regional Water Board at the same time this Order is considered. This Order would allow the transfer of the Group B spring water from the ODSs into Skyrocket Pit Lake. If adopted, the NPDES permit would allow the wastewater stored in Skyrocket Pit Lake to be discharged to Littlejohns Creek during periods of high runoff. The purpose of the discharge would be to lower Skyrocket Pit Lake to an operating level that would (a) stop the current seepage from the lake into the Littlejohns Creek Diversion and (b) reverse the groundwater flow inward toward the lake, thus capturing degraded groundwater. This

DESCRIPTION OF SITE

15. The project is underlain by complexly deformed meta-sedimentary and meta-volcanic rocks. The rocks belong to the Salt Springs Phyllites (formerly Mariposa Formation), which are deep ocean deposits that contain high sodium and chloride ratios, and the Copper Hill Volcanics (formerly Logtown Ridge Formation) that contain high magnesium and bicarbonate ratios. The Salt Springs Phyllites and Copper Hill Volcanics are both of Jurassic age.

16. The Bear Mountains Fault Zone, consisting of the Hodson and Littlejohns faults and related structures, passes through the area and trends northwest-southeast. These faults generally separate the ultramafic (serpentine) from the phyllites. There has been no documented Holocene fault movement in the area. Hydraulic conductivity tests show the phyllite rocks are generally west of the fault zone and have a very low hydraulic conductivity.

17. The soil types include Argonaut, Auburn, and Whiterock soils. These soils are classified as silts and clayey silts with some sand and gravel. The soils are generally well to moderately well drained.

18. Groundwater generally flows to the south-southeast, along the topographic slope and the predominant fault and fracture direction. Cross faulting also occurs in the area allowing ground water movement to the southwest.

19. North Pit and Skyrocket Pit were dewatered during mining, creating hydraulic sinks. Since mining operations ceased in 1994, both North Pit and Skyrocket Pit began to fill with groundwater, as well as surface water, transfers from ODSs and FTR, and meteoric water. As a result of subsequent filling, the surface water elevation in Skyrocket Pit has reached a level that has resulted in a reversal of groundwater flow direction (i.e. mounding) at the southeastern end of the pit. Since April 1999, groundwater elevations demonstrate that groundwater is now flowing from Skyrocket Pit to the east-southeast towards GWM-12, PZ-4 and the Littlejohns Creek Diversion.

GROUNDWATER AND SURFACE WATER (GENERAL)

20. The main issue related to groundwater and surface water at this site is that water has come into contact with waste, dissolved metals, and other inorganics. These dissolved inorganic constituents exceed background concentrations and beneficial use criteria, and have been released to groundwater and surface water from the WMUs.

21. Another major issue at this site is that water, which has come in contact with waste, is being stored throughout the facility. This storage has caused year-round flows in previously perennial streams. Except for extremely wet years, the summertime stream flows are likely entirely composed of wastewater from the WMUs. This storage of wastewater is also causing heads on WMUs liners and mounding that is releasing wastewater to groundwater. This water storage is causing a water balance issue that must be resolved before the site no longer causes impacts to surface water and groundwater. This Order requires a plan to resolve the impacts to surface water and groundwater.

22. Before mining began in 1989, groundwater and surface water quality varied widely across the site. Good to poor quality water was found west of Hodson Fault; to the east of the Hodson and Littlejohns faults, water was of good quality; and between the faults groundwater varied from good to fair quality. This difference in water quality from one side of the faults to the other is associated with varying rock types. Because there is a large variation in natural water quality, a more thorough evaluation of the water chemistry is required from each well and surface water monitoring location relative to the geologic (rock type) position of the sampling point. This evaluation is completed in later Findings. In these later Findings, most of groundwater and surface water comparisons are from one data period to

another, showing change overtime. Comparisons are made between pre-mining data (or early mining data) versus sampling results after mining up to present day. Because of the naturally varying water quality, “background” at most sampling points is considered to be pre-mining data.

23. The following Findings describe groundwater and surface water quality in general, using the chemical signature of the water. A chemical signature is the relative portion of one chemical to another in a sample. This chemical signature is used to determine if one sampling point is similar to another sampling point, or if water quality has changed from one sampling period to another. Staff’s analysis shows that the chemical signature is generally consistent from one sampling location to another in a particular rock type. Also, the mine-impacted water demonstrates a significantly different chemical signature than the original background water chemistry.

General Groundwater Observations (not related to WMUs)

24. The facility contains three distinct geology-related groundwater zones, each of which are separated by faults. East of the Littlejohns Fault, the groundwater is primarily in a greenstone formation. Between the Littlejohns Fault and the Hodson Fault to the west, groundwater is in a mixture of greenstone and phyllite. West of the Hodson Fault, groundwater is primarily in a phyllite formation. The following findings describe the groundwater geochemical differences between these three zones.

25. Wells constructed within the greenstone include: PZ-1, GWM-1, GWM-2, GWM-4, GWM-11, GWM-15, GWM-18/30, GWM-26, GWM-33, GWM-35A/B, GWM-36A/B, and GWM-37. Well logs from these individual wells show that they are drilled through greenstone for the entire length of the gravel pack and screen interval. Groundwater chemistry associated with the greenstone indicates the anions are generally higher in bicarbonate relative to sulfate and chloride. Magnesium and calcium are the major cations, with sodium being relatively insignificant.

26. Wells constructed within the phyllite include: GWM-10, GWM-19, GWM-20, GWM-31, and GWM-32. The well logs from these individual wells show that they are drilled through phyllite for the entire length of the gravel pack and screen interval. Groundwater chemistry associated with the phyllites is generally high in sodium and chloride when compared to bicarbonate, calcium and magnesium.

27. Wells constructed between the Hodson and Littlejohns Faults generally have a mixture of phyllite and greenstone in the borehole. The monitoring wells in this area include: GWM-3, GWM-6, GWM-16, and GWM-25. Again, the well rock type is based on well logs from these individual wells, which shows that they are drilled through greenstone and phyllite for the entire gravel pack and screen interval. Groundwater chemistry associated with these wells is generally high in calcium when compared to sodium. Bicarbonate is the dominant anion.

28. The following table shows the groundwater quality from the pre-mining (or before mining impacts) period and unimpacted monitoring well data for each of the three geologic units. The data shown is the average concentrations from each category of wells listed in the above three Findings.

Constituent	Units	Greenstone Average Concentration	Phyllite Average Concentration	Mixed Average Concentration
pH	Number	7.6	7.4	7.4
Specific Conductance	µmhos/cm	413	8970	687
Total Dissolved Solids	mg/L	256	6434	467
Chloride	mg/L	16	2005	13
Sulfate	mg/L	17	1923	68
Calcium	mg/l	27	--	104
Magnesium	mg/l	32	--	--
Bicarbonate	mg/L	152	256	271
Sodium	mg/L	11	2086	22

29. Upgradient water quality on the eastern side of RMKM is not well known. The groundwater quality east of the FTR ODS near Littlejohns and Underwood Creeks requires definition. A monitoring well in this area would also provide needed groundwater gradient information. This Order requires that water quality in this area be defined, to provide a more conclusive evaluation of groundwater impacts when considering final mine closure options.

General Surface Water Observations (not related to WMUs)

30. Surface water at the site is drained by Littlejohns Creek, Underwood Creek, and the most northeasterly tributary of Clover Creek. These surface waters drain to Flowers Reservoir, downstream of the site. Flowers Reservoir drains to Littlejohns Creek. Littlejohns Creek then discharges to French Camp Slough, which is tributary to the San Joaquin River.

31. As described in the Sacramento River and San Joaquin River Water Quality Control Plan (Basin Plan), the beneficial uses of the San Joaquin River are: municipal, domestic, industrial, and agricultural supply; recreation and esthetic enjoyment; warm and cold freshwater habitat; migration; spawning; and wildlife habitat. Surface water drainages are presented in Attachment D, which is incorporated herein and made part of this Order by reference.

32. Prior to mining, all the streams flowing through the property were intermittent to seasonal streams. Most flow occurred during or just after rainfall. During the late spring, summer, and fall no stream flow occurred. Presently, year round flow occurs at the Littlejohns Diversion through sampling point SWM-10 to Flowers Reservoir. However, no flow occurs upstream of the facility from late spring through fall.

33. Prior to mining, upgradient surface water quality east of the fault zone was generally good with TDS concentrations ranging from 50 to 265 mg/L at SWM-1 and SWM-4. SWM-1 and SWM-4 are located on Littlejohns Creek and Undrwood Creek, respectively. These TDS concentrations are well below the drinking water standard. There was no detectable arsenic, and very low to non-detect concentrations of various trace metals.

34. Prior to mining, surface water quality downstream and west of the fault zone varied greatly, depending on sampling location and flow conditions at the time of flow, with better water quality during higher flow conditions.

35. SWM-2 is directly downgradient of the Skyrocket Pit on Littlejohns Creek. Pre-mining sampling performed at this location in 1987 and 1988 represents sampling of Littlejohns Creek during extreme low rainfall seasons, and consequently concentrations of TDS and other constituents were higher than in a normal wet season. TDS concentrations reported ranged from 865 to 4,065 mg/L and metals concentrations were low. Sodium and chloride concentrations reported were higher than sulfate, calcium and magnesium, which is typical of water associated with the phyllites. Because the next sampling event after 1988 was after Littlejohns Creek was diverted around Skyrocket Pit, no "normal" water year pre-mining samples were collected from Littlejohns Creek.

36. SWM-10 receives flows from the diverted Littlejohns and Underwood Creeks and a small drainage north of Gold Knoll ODS. Based on monthly sampling results from 1990 to 1997, flows only occurred at SWM-10 from December to May of each year. This sampling point would capture any discharges or springs associated with the FTR, FTR ODS, Skyrocket Pit to the east and southeast, and Gold Knoll to the North. In 1990, when SWM-10 was first being sampled and before any significant discharges from these units occurred, the TDS concentrations ranged from 52 to 363 mg/L and metal concentrations were low. It appears no significant summer time discharge from any mining unit occurred until June 1998, when Skyrocket Pit Level reached 953 ft above MSL.

37. From 1990 to 1997, 28 of the 34 samples collected at SWM-10 had TDS less than 350 mg/L and 16 of those were below 200 mg/L.

38. According to the record, the Littlejohns Creek Diversion at SWM-10 started flowing year-round in 2000. The annual monthly TDS averaged 1,243 mg/L and was reported as high as 2,330 mg/L. Sulfate also increased from mostly under 100 mg/L to become the dominate salt in the water ranging between 450 to 900 mg/L in 2000. In 2005 and 2006, sulfate concentrations increased to over 1,300 mg/L.

39. It is unclear what surface water elevation causes the Skyrocket Pit Lake to flow into Littlejohns Creek Diversion because the exact elevation of the Diversion creek bed is unknown. These WDRs require the Discharger to survey the Diversion creek bottom elevation.

40. SWM-3 is the surface water monitoring point at the outfall of Flowers Reservoir. Flowers Reservoir is downgradient of RMKM and captures all the surface water flows in contact with the mine site. This reservoir also captures Clover Creek and several other small, unnamed seasonal drainages. Flowers Reservoir is located in the Diamond Twenty subdivision and is used as an irrigation supply and recreational facility. Flowers Reservoir likely recharges groundwater, which is used as a domestic supply by property owners in the Diamond Twenty subdivision.

41. SWM-3 shows the impacts at Flowers Reservoir since mining began. During the pre-mining period (1987 and 1988), TDS and sulfate concentrations averaged 479 mg/L and 84 mg/L, respectively. These concentrations are higher than the results for the next five years (1989 to 1993), due to evapoconcentration of naturally occurring salts as a result of drought conditions that prevented dilution from storm water

42. In 2006, SWM-3 had average TDS and sulfate concentrations of 753 mg/L and 368 mg/L, respectively. Both TDS and sulfate have increased since 1987. The 2005/2006 rainy season was extremely wet, with more available dilution, yet even with the increased precipitation, the five highest concentrations of TDS reported were detected in 2006 ranging from 1000 to 1150 mg/L. This indicates that salts continue to concentrate in Flowers Reservoir over time. Another important constituent is arsenic, which in 1987-1988 was less than 0.010 mg/L. During 1993, arsenic was reported at 0.006 mg/L, and in 2006 arsenic has increased to 0.012 mg/L. In the dryer year of 2005, arsenic was reported at it highest concentration of 0.034 mg/L.

43. The data shows that RMKM has impacted surface water. The major issue is storage of excess water that has created the year-round flow in the previously intermittent creek. In the winter months, dilution occurs which lowers the salts and metals concentration in surface water. In the summer months, all the flow coming from the mine site is collected in Littlejohns Creek. This water contains elevated levels of salts and metals that are not being diluted, thus impacting the downstream creeks and Flowers Reservoir.

44. These WDRs require that the Discharger capture all springs that are associated with flows from the WMUs. These springs are to be captured and managed so they are no longer a threat to water quality.

INDIVIDUAL SITE DESCRIPTION

1. Flotation Tailings Reservoir (FTR)

45. The FTR (also known as WMU #1) was constructed in an intermittent stream valley northeast of North Pit Lake. The FTR was designed utilizing naturally occurring clay and fine-grained tailings as a bottom liner system. The southern portion of the FTR bottom liner system was constructed with 2-feet of clay with a maximum hydraulic conductivity of $8x10^{-7}$ cm/s. The northern portion of the FTR

bottom liner system was constructed with 1-foot of clay with a maximum hydraulic conductivity of $8x10^{-8}$ cm/s. The FTR contains 6.5 million tons of flotation tailings.

46. Flotation tailings solids stored in the FTR were classified as a Group C mining waste per Section 22480 of Title 27 based on a net neutralization potential of 179 tons of $CaCO_3$ equivalent per 1000 tons of ore, and the lack of any significant extractable substances using the deionized water waste extraction test.

47. Flotation tailings liquid in the FTR were classified and managed as a Group B mining waste, based on the presence and potential presence of flotation reagents or their breakdown products, some heavy metals in the flotation tailings liquid, and elevated levels of TDS. All of these conditions indicated a potential threat to groundwater and surface water quality near the FTR.

48. The FTR was closed as a Group C mining waste management unit in 1997. Closure consisted of the following:
   - Regrading the surface to a minimum slope of one percent;
   - Placement of six inches of soil over the tailings, followed by revegetation;
   - Construction of ditches along the eastern edge of the FTR;
   - Construction of a permanent spillway through the embankment and swales connecting to the spillway to allow free drainage of surface water from the FTR; and
   - Continued discharge of leachate from the FTR's Leachate Collection Recovery System (LCRS) to Skyrocket Pit.

a. FTR Drains (Spring, Spine, Foundation, and LCRS)

49. Flotation tailings liquid within the FTR is collected by a LCRS, which was designed to drain the FTR. The LCRS overlies the outer clay layer and is a network of perforated pipes in drain rock that is intended to minimize the hydraulic head on the outer liner. It was constructed with 4-inch diameter perforated drain pipe covered with crushed rock sized between 0.5 and 6-inches.

50. Groundwater and spring water beneath the FTR is managed by a series of drains described as Spine Drain 1, Spine Drain 2, and the Spring Drain. These drains were utilized during mining operations to maintain separation of groundwater from the outer clay liner. The Spine Drains consist of a network of interconnected trenches below the clay liner that contain perforated plastic pipe and gravel. The Spring Drain consists of a spring collection sump with a pipeline in a gravel filled trench conveying spring flow to the FTR drain collection sump.

51. The FTR also has a Foundation Drain used to drain water from the foundation of the embankment. The Foundation Drain consists of vertical boreholes/wells constructed in the embankment foundation trench fitted with pipes that convey the collected water to the FTR drain collection sump.

52. The spine, spring, and foundation drains under the FTR were closed in October 1998 as a test to determine the effects of blocking the FTR drains on 1) groundwater conditions, 2) containment of the FTR and 3) Skyrocket Pit lake level. According to the 20 July 2007 Report of Waste Discharge, the test results submitted periodically to the Regional Water Board demonstrated that blocking the drains resulted in an inward gradient across the outer liner of the FTR (i.e. groundwater was flowing into the FTR and reporting to the LCRS drain). However, the data in the record does not support this conclusion

53. Previous WDRs required the Discharger to discharge FTR leachate to Skyrocket Pit. In March 2003, the Discharger shut down the LCRS, discontinuing the required discharge of leachate to Skyrocket Pit in violation of WDRs No. 5-01-040 and inconsistent with the approved closure plan. State Water Board Order WQO No. 2004-0007 stated that the Regional Board could not take enforcement action against this WDR violation, but could require the transfer to begin again upon adoption of revised WDRs.

54. Water levels within the FTR tailings are monitored by Piezometers FPZ-1A/1B and FPZ-2. FPZ-1A is deeper than FPZ-1B and recorded water levels in FPZ-1A have always recorded lower than water levels in FPZ-1B, indicating a downward gradient and downward flow of water through the tailings.

55. The FTR's ground surface elevation is approximately 1,050 feet above mean sea level (MSL), while the reference elevation of the LCRS is 978.16 MSL. After the LCRS valve was closed in March 2003, water levels in Piezometer FPZ-1A and FPZ-1B sharply increased, rising to near the ground surface of the FTR during the second quarter of 2006. Water levels in the LCRS also increased, reaching a maximum reported elevation of 1046.39 during the first quarter 2006. The spine and spring drain also reached their maximum reported elevations during this period (1038.69 MSL and 1034.61 MSL, respectively). Because the LCRS elevation is higher than the spine and spring drains, this indicates an outward gradient from the LCRS through the liner to groundwater.

56. Attachment C of the RWD provides seepage calculations across the outer clay liner of the FTR. The calculations indicate groundwater from the spine and spring drains is moving across the outer clay liner into the FTR. These calculations are based on March 2003 water levels recorded in the Spine Drain, Spring Drain , and LCRS. However, it is not appropriate to use this data to predict current conditions, as this is the period when the LCRS was at its drained elevation (prior to closure in 2003), while at the same time the spine and spring drains were closed causing a higher head. The Discharger has not calculated seepage rates using current data through the wet season of 2007, which would show how the system is acting after both the LCRS and spine/spring drains were closed for four years. Staff's review of the present data finds an outward flow through the liner.

57. Based on the Findings above, the closure of the LCRS, spine, spring, and foundation drains has allowed Group B mining waste to fill the FTR tailings facility,

resulting in approximately 50 feet of head over the LCRS system and clay liner during the 2006 wet season. The purpose of the LCRS system is to minimize the hydraulic head on the outer clay liner; however, that is no longer the case in this unit.

58. An additional source contributing to increased head in the piezometers and LCRS is infiltration of meteoric water through the cover. The FTR cover was constructed with six inches of soil and then vegetated. The RWD indicates the Discharger views the soil cover as a functioning “earthen evapotranspirative” cover and that data supports the conclusion that meteoric water is not infiltrating the cover into the tailings. However, The RWD provides no engineered design drawings or calculations supporting the claim that the cover functions as an evapotranspirative (ET) cover. Based on staff knowledge of ET covers and designs, climatic conditions of the site, and engineered ET covers constructed at other locations within the region, a functioning ET cover would require a minimum soil cover and vegetated layer of at least three to four feet thick. The current cover has not been reviewed or approved as an ET cover by Regional Water Board staff and does not meet the specifications of Title 27, Section 21090(a)(1)(2). Therefore, it is not considered an ET cover.

59. The RWD states that meteoric water is “infiltrating the surface of the FTR contributing to the LCRS flows.” Based on climatic conditions of the site, rainfall during the November through March wet season can be generally characterized as short duration but intense season. Evaporation is minimal at best during the wet season and based on climate information provided by the Discharger, precipitation is greater than evaporation during the wet season by 7.73 inches. This difference equates to 90.16 acre feet of water over the 140 acre FTR, which means approximately 29,000,000 million gallons of precipitation is not being evaporated when in contact with the FTR cover.

60. The RWD states “infiltration occurring into the FTR during the wet season is completely evaporated during the ensuing dry season so that the net accumulation of infiltration water in the FTR is zero.” The RWD does not account for percolation into the cover during the wet season and provides no substantial evidence to support this claim.

b. Love Pond Spring

61. As a result of the closure of the LCRS, spine, spring, and foundation drains, infiltration of meteoric water through the surface of the FTR, and the subsequent rising water levels in the FTR, large springs developed at the base of the FTR-ODS in response. Group B mining waste appears to be discharging from the base of the FTR-ODS in an area known as Love Pond Spring. The spring discharges into Littlejohns Creek Diversion.

62. According to the Discharger’s April 2007 document submitted in response to TSO R5-2006-0900, Love Pond Spring was first found to be flowing in July 2005 at an estimated rate of 900 gallons per minute (gpm). Flow measurements were not

recorded during October 2005 through April 2006. In May 2006 the flow was 786 gpm and in October 2006 was 49 gpm.

63. During the period discussed in Finding 62, all flow recorded at surface water monitoring station SWM-16 (located in Littlejohns Diversion) was due to Love Pond Spring. Staff also noted that surface water flows reported for Love Pond Spring coincide with the rise of groundwater levels in the FTR piezometers.

64. The RWD states "Previous evaluations indicated that the capacity for regional flow of groundwater under the FTR is in the range of 4 to 60 gpm. This is the maximum amount of groundwater that flows through the FTR valley at the hydraulic head and permeability conditions observed during and after mining with the LCRS drain open." However, the RWD does not contain an evaluation of seepage rates following closure of the LCRS. This evaluation may lead to the conclusion that the FTR has been allowed to build up head and is now expressing itself as Love Pond Spring.

65. According to the electronic data provided by the Discharger, Love Pond Spring has been sampled four times since it began flowing in 2005, as shown below.

Average Concentrations for Love Pond Spring (May 2006 – March 2007)

TDS	Sulfate	Sodium	Calcium	Bicarbonate
2,315 mg/L	1,205 mg/L	208 mg/L	176 mg/L	239 mg/L

66. The water chemistry presented below indicates that the Love Pond Spring source is related to the FTR rather than surface water. As discussed above, staff believes the source of Love Pond Spring is due to water levels rising in the FTR, forcing that water through the compromised liner into the weathered zone and/or bedrock fractures, and flowing to the discharge point at Love Pond Spring and/or into groundwater. The chemical makeup of FPZ-1A leachate, groundwater at GWM-30, and surface water at Love Pond Spring indicate the source of degradation is similar.

Water Chemistry comparison

Location	TDS	Sulfate	Sodium	Calcium	Bicarbonate
FPZ-1A	2,030mg/L	820 mg/L	510 mg/L	59 mg/L	319 mg/L
GWM-30	2,575 mg/L	1,401 mg/L	118 mg/L	225 mg/L	293 mg/L
Love Pond Spring	2,315 mg/L	1,205 mg/L	208 mg/L	176 mg/L	239 mg/L

67. The WDRs requires a new closure plan for the FTR because the previous closure is no longer valid with the closure of the LCRS.

c. FTR and FTR ODS Groundwater

68. Groundwater elevation within the FTR is monitored by several wells as shown on Attachment C. Wells FPZ-1A and FPZ-1B are located in the southern portion of

the WMU, whereas FPZ-2 is located in the northern portion of the WMU. Two monitoring events from FPZ-1A were available for water quality evaluation.

69. Groundwater chemistry within the FTR is characterized by high TDS, sulfate, sodium and bicarbonate. This is to be expected since the waste material within the FTR is comprised of phyllite (sodium) and greenstone (bicarbonate) rocks. The sulfate is provided by mineralized ore that has oxidized. Sulfate is the dominant constituents of the TDS. The average concentrations from May 2006 and January 2007 are:

Average Concentrations from Well FPZ-1A (May 2006 – January 2007)

TDS	Sulfate	Sodium	Calcium	Bicarbonate
2,030 mg/L	820 mg/L	510 mg/L	59 mg/L	319 mg/L

70. Groundwater in the vicinity of the FTR is monitored by monitoring wells GWM-02 and GWM-30. These wells have been identified as Greenstone wells and are located east of the mineralized fault zone, which means that groundwater in this region is of high quality. GWM-30 is located downgradient of the FTR-ODS (see Attachment C).

71. Pre-mining water quality data for GWM-02 was presented in staff's *Technical Analysis of Water Quality Changes at the Royal Mountain King Mine Report* (Technical Report) dated 1 April 2003. Groundwater data for GWM –02 was evaluated from 1987 through 1989 (pre-mining); January – October 2000; and July – April 2007. As indicated in the Table below, groundwater associated with well GWM-02 contained typical concentrations associated with greenstone wells (low sulfate and sodium and high bicarbonate.) By the year 2000, mining impact indicator parameters (sulfate and TDS) had increased (following the closure of the FTR in 1997). Current groundwater concentrations indicate much the same concentrations as those reported in 2000.

Average Concentrations From Well GWM-02

Analyte	Pre-mining (1987 – 1989)	January – October (2000)	July – April (2007)
TDS	329 mg/L	1,007 mg/L	828 mg/L
Sulfate	15.6 mg/L	370 mg/L	271 mg/L
Sodium	8.7 mg/L	51 mg/L	58 mg/L
Calcium	38 mg/L	95 mg/L	97 mg/L
Bicarbonate	238 mg/L	308 mg/L	314 mg/L

72. It is evident from the above Finding that groundwater quality of well GWM-02 has worsened over time. In less than 20 years, TDS and sulfate has increased over pre-mining concentrations approximately 2.5 and 17 times, respectively. Concentration increases in GWM-02 are due to water coming into contact with FTR solids that is leaking through the liner system to groundwater.

73. As discussed in Finding 57, the closed LCRS, Spring, and Spine drains have allowed water levels to rise in the FTR, which has increased the head on the outer clay liner thus increasing the seepage rates across the liner. Based on the depth to water measurements recorded during the second quarter 2007 monitoring event, the depth to water in well GWM-02 was 986.4 feet msl. The depth to water recorded in the FTR-LCRS during the second quarter 2007 monitoring event was 1028.2 feet msl, a difference of 41 feet of head. The Discharger has allowed water to be stored in the FTR, which has caused a head to build up behind the FTR Dam. It appears that water has been flowing through the outer clay liner and into the fractured bedrock and groundwater as shown by the concentration increases in Finding 71.

74. As discussed in the 1 April 2003 Technical Report, well GWM-30 is downgradient of the FTR and FTR-ODS. Therefore, groundwater quality beneath these units cannot be separated. Based on a review of the electronic data submitted by the Discharger, it appears that pre-mining groundwater quality collected from well GWM-30 was of high quality as typically found in the Greenstone (low sulfate and sodium and high bicarbonate.) By the year 2000, mining impact indicator parameters (sulfate and TDS) increased (following the closure of the FTR in 1997). Current concentrations from sampling events from April 2003 through January 2007 indicate that groundwater in the vicinity of well GWM-30 continues to be affected by mining impacts and that mining impact indicator parameters continue to increase over time.

Average Concentrations From Well GWM-30

Analyte	Pre-mining (1989)	January – October (2000)	April - January (2003-2007)
TDS	339 mg/L	2,499 mg/L	2,575 mg/L
Sulfate	26 mg/L	1,374 mg/L	1,401 mg/L
Sodium	13 mg/L	145 mg/L	118 mg/L
Calcium	23 mg/L	204 mg/L	225 mg/L
Bicarbonate	221 mg/L	260 mg/L	293 mg/L

75. Based on the increasing concentrations presented in the above table, it can be concluded that groundwater in the vicinity of well GWM-30 has been impacted by the discharge of waste at the FTR and FTR-ODS.

76. According to the Second Quarter 2007 Monitoring Report, the Discharger claims overall groundwater concentration increases are a result of changing hydrologic and natural groundwater quality conditions in the vicinity of the FTR. Several groundwater monitoring wells (with only one sampling event) exist adjacent to the perimeter of the FTR that show little change from pre-mining water quality of GWM-02. Wells FPZ-3 through FPZ-6 are monitored for depth to water and water quality. Groundwater concentrations reported for FPZ-3 and FPZ-6 appear to be

similar in concentration to the pre-mining concentrations of GWM-02 and GWM-30 shown in the above. Groundwater associated with FPZ-3 and FPZ-6 is typical of greenstone wells, which is low in sulfate and sodium and high in bicarbonate. Constituents of concern analyzed in January 2007 are presented below:

Groundwater Concentrations for FPZ-3 and FPZ-6 (January 2007)

Well ID	TDS	Sulfate	Sodium	Calcium	Bicarbonate
FPZ-3	350 mg/L	30 mg/L	32 mg/L	38.5 mg/L	288 mg/L
FPZ-6	320 mg/L	20 mg/L	7.7 mg/L	35.9 mg/L	261 mg/L

77. Based on the above evaluation, it appears that high quality groundwater exists west and east of the FTR and represents no change in the hydrologic and natural groundwater quality conditions in the vicinity of the FTR. Mining activities have caused increases of TDS and sulfate in the groundwater.

d. FTR and FTR ODS Surface Water

78. Surface water in the vicinity of the FTR and FTR-ODS is monitored for water quality at four sampling points: the FTR-ODS located south of the ODS, and the FTR-east, FTR-west and Love Pond Spring.

79. The FTR-ODS sampling point is located at the southern base of the ODS, northeast of SWM-06 in Littlejohns Creek. There is little information describing this sampling location but it is assumed the FTR-ODS sampling location refers to a seep that pools at the base of the FTR-ODS. The electronic database indicates surface water samples were collected from the FTR-ODS location between May 1998 and February 2000. The data is presented below.

Average Concentrations for FTR-ODS (March 1998 – February 2000)

TDS	Sulfate	Sodium	Calcium	Bicarbonate
448 mg/L	403 mg/L	121 mg/L	62 mg/L	96 mg/L

80. Surface water analyzed from the FTR-ODS contains concentrations of TDS, sulfate, and sodium over the background concentration limits established in Monitoring and Reporting Program No. 5-01-040. It appears that surface water directed to the base of the FTR-ODS has been at least partially impacted by the mining unit.

81. Upon examination of Love Pond Spring data in Finding No. 66 and the FTR-ODS surface water quality data above, it appears the water chemistry between the two locations is very different and therefore, likely of different sources. The FTR-ODS surface water samples appear to be in contact with the surface of the FTR-ODS. This surface water is only available for sampling during the winter and early spring when runoff is occurring. This assumption can be drawn from the sampling dates provided, as no samples were taken during the summer or fall.

2. Overburden Disposal Units (General)

82. During operation of the mine, approximately 54 million tons of overburden were removed from the three pits and disposed in either the: (1) West ODS, (2) FTR ODS, or (3) Gold Knoll ODS. Reclamation of each ODS was conducted during the mine operation period. The slopes were graded to natural looking slopes ranging from 2:1 to 3:1 (horizontal:vertical), covered with 6 inches of topsoil, fertilized and revegetated, and trees and shrubs were planted in irrigated trenches. In 1998, the covers of the West and Gold Knoll ODSs were enhanced by regrading the tops to a minimum two percent slope, placing a cover consisting of a minimum of four inches of compacted clayey topsoil over selected areas, and revegetating. It is noted that the enhanced covers do not extend over the entire ODSs.

83. Overburden in the West, Gold Knoll, and FTR ODSs was conditionally classified as Group C mining waste in the original WDRs (Order No. 88-176) because the material was non-acid generating. However, the WDRs did not allow any statistically significant increase in background concentrations of arsenic or any other inorganic constituent due to the disposal of overburden or other mine activity, and required the Discharger to provide financial assurance for mitigation of any water quality impacts, including but not limited to covering the overburden piles with a clay cap and conducting any necessary groundwater or surface water remediation. The original Group C mining waste classification was maintained in all subsequent WDRs, through Order No. 97-165.

84. Statistically significant increases over background were detected for several constituents downgradient of the ODSs, as described below. Because the leachate from these ODSs has impacted groundwater and surface water, they were re-classified as a Group B Mining Waste in WDR No. 5-01-040.

a. Overburden Disposal Sites Reclamation and Title 27 Closure

85. The Discharger conducted infiltration/permeability testing on the West and Gold Knoll ODSs in February 2000 in the areas where cover enhancements were performed. The testing procedure was a modified procedure developed by the U.S. Bureau of Reclamation. The Discharger concluded that the enhanced cover material has hydraulic conductivity about 1×10^{-5} cm/sec. This hydraulic conductivity is equivalent to fine sand or silty sand versus a low permeable compacted clay cover.

86. The existing closure of the ODSs does not comply with Title 27 requirements for Group B mining waste. However, State Water Board's Order No. 2004-007 determined that placing a Title 27 prescriptive cover on the ODSs would not be effective in preventing groundwater from coming in contact with waste. This conclusion was based on the fact that the bottom of the units are not lined, and the State Water Board's belief that groundwater was upwelling into the waste and being degraded. The Order also stated that a cover preventing storm water from percolating through the waste would not substantially reduce the flow of the

discharge or improve the water quality.

87. As described in greater detail in the attached Information Sheet, The State Board found that it is appropriate to consider alternative closure methods, and once they are implemented, the overburden disposal sites could be reclassified from Group B mine waste units to Group C mine waste units. Although the State Board Order highlights wetlands as an alternative closure method, the Dischargers have since determined that wetlands are not a viable method and therefore these WDRs do not address wetlands.

88. This Order requires that a Closure Plan be submitted for all the ODSs. Following the intent of the State Water Board Order, the Discharger is required to submit an engineered alternative to demonstrate that the proposed closure will meet the performance standards of Title 27 Section 22510, i.e., “New and existing Mining Units shall be closed so that they no longer pose a threat to water quality.” The Discharger may consider the use of alternative regulatory measures in its closure plan, including a containment zone or de-designation of beneficial uses of the groundwater or surface water.

3. Gold Knoll ODS

89. The Gold Knoll ODS is located in the area of the first mining. Gold Knoll pit was filled with overburden from Sky Rocket Pit. In addition, some surrounding land was also covered by overburden until the disposal area covered approximately 60 acres. The former pit filled with groundwater and storm water that came in direct contact with the waste rock. The groundwater mounded above previous land elevation causing a spring (seepage) at the base of the ODS. This mounding was due to the increased permeability of the disturbed land surface, the coarse nature of the waste rock, and the continued reapplication of collected seepage water over the top of the Gold Knoll ODS.

a. Gold Knoll ODS Surface Water

90. SWM-09 is a sampling location on an unnamed stream downgradient of Gold Knoll ODS. Before mining began, TDS concentrations ranged from 116 to 485 mg/l and sulfate concentrations ranged from 18 to 108 mg/l.

91. Seepage flow rates from Gold Knoll ODS have been measured from a low of 1 gpm during the dry season to as high as 266 gpm during the wet season. Seepage from Gold Knoll ODS has maximum concentrations of arsenic (0.024 mg/L), chloride (245 mg/L), nitrate (104 mg/L), selenium (0.090 mg/L), sulfate (3,990 mg/L), and TDS (6,410 mg/L). These values exceed water quality objectives.

92. In response to elevated TDS concentrations in seepage from the Gold Knoll ODS, a temporary control measure was implemented at the base of the ODS. A well, seepage collection trench and level-activated barge pump were installed to collect and remove the high TDS seepage from this area. The collected water was pumped to the surface of the ODS for evaporation and infiltration into trenches

directly overlying the backfilled Gold Knoll Pit. This reinfiltration system operated between December 1995 and July 1997, and again from November 1997 to early January 1998.

93. Due to the increase in seepage flow and concentrations of TDS, the Discharger requested that seepage from Gold Knoll ODS be discharged into Skyrocket Pit. In a 29 August 1997 letter Regional Water Board staff approved the transfer of Gold Knoll seepage to Skyrocket Pit on an immediate short-term basis for the winter of 1997/1998. The seepage was to be blended with other on-site waters discharged into Skyrocket Pit so that the blended water met transfer standards specified in Order No. 97-165.

94. The Discharger discharged Gold Knoll ODS seepage into Skyrocket Pit from February 1998 to the November 2000. However, concentrations of sulfate, selenium, nickel, and TDS in this seepage did not meet the transfer standards specified in WDRs No. 5-01-040 for wastewater transferred to Skyrocket Pit.

95. Seepage flow rates associated with Gold Knoll ODS correlate to precipitation rates. Increases in seepage rates are noted shortly after increases in precipitation with seepage rates decreasing gradually after winter rains.

96. Based on the data from October 2004 to present, the unnamed stream sampled at SWM-9 is still showing impacts from discharges from the Gold Knoll ODS, even though most of the seepage water is being captured. TDS concentrations fluctuate in early winter between 1,950 to 5,000 mg/l and by mid-winter and early spring from 160 to 470 mg/l. The higher TDS concentrations are due to large increases in sulfate (1,420 to 3,220 mg/l), which is indicative of sulfide ore mining. The lower TDS concentrations in mid-winter and early spring are because of flows from a tributary, which does not start flowing until a stockpond overflows and dilutes the stream. The stockpond TDS discharge ranges from 100 to 600 mg/l with most results being below 350 mg/l.

b. Gold Knoll ODS Groundwater

97. A release of waste constituents northwest, northeast, and southeast of the Gold Knoll ODS to groundwater has been detected in GWM-11, GWM-21, and GWM-26, as shown in the table below. The concentrations found in GWM-11, GWM-21 and GWM-26 have increased overtime and mining impact parameters (such as TDS and sulfate) are significantly elevated compared to concentrations reported in the 1988/1989 sampling results.

Monitoring Well	Constituent	1988/1989	2006
GWM-11	TDS	156 mg/L	1,328 mg/L
	Sulfate	10 mg/L	650 mg/L
	Nitrate	2.5 mg/L	13 mg/L
	Selenium	<0.005	0.012 mg/L

GWM-21	TDS	1,667 mg/L	4,230 mg/L
	Sulfate	288 mg/L	1,875 mg/L
	Nitrate	<1.0 mg/L	67 mg/L
	Selenium	<0.005	0.056 mg/L
GWM-26	TDS	223 mg/L	340 mg/L
	Sulfate	10 mg/L	15 mg/L
	Nitrate	<1.8 mg/L	13 mg/L
	Selenium	<0.005	<0.001 mg/L

98. Based on the information above, groundwater contamination east-southeast of Gold Knoll ODS has not been adequately defined. These WDRs require that the Discharger provide a lateral and vertical groundwater extent determination in accordance, which will require the installation of additional monitoring wells.

4. Western ODS

99. The Western ODS is on western edge of the facility, west of Skyrocket Pit, southwest of North Pit and north of Littlejohns Creek. This ODS covers a surface area of approximately 125 acres. A north-south canyon was filled in with overburden from North and Skyrocket Pits. Surface water and groundwater has been impacted by water percolating through the waste as described in the following findings.

a. Western ODS Surface Water

100. The Discharger monitors seepage from the Western ODS at five different locations (West ODS 1, 2, 3, 4, and 5). Some of these springs did not begin discharging until after the Western ODS was created. Seepage at West ODS 2 is continuous year round, while seepage at the remaining locations occurs only during, and for a short time after, the wet season. All these seepage locations are presently being captured and either spray irrigated back onto the Western ODS or discharged to Skyrocket Pit.

101. SWM-08 is a surface water sampling location on the western side of the Western ODS. SWM-08 samples an intermittent stream directly downgradient of the ODS. This stream discharges into Clovis Creek, which flows into Flowers Reservoir. The table below depicts three sampling periods: the 1987-1988 period is pre-mining data, the 1997 data represent the results after overburden was deposited, and the 2006-2007 data represents current data results after the spring at the base of the ODS was captured. Once overburden was placed above SWM-8, sulfate, TDS, and nitrate concentrations increased significantly and the overall water chemistry was significantly different than background. In 2002, sumps were built and water was captured at the bottom of the Western ODS, causing SWM-8 sampling results to return to near background conditions.

SWM-8 Sampling

Constituent	1987-1988 average	1997 10 July 1997	2006-2007 average
TDS (mg/L)	815	3960	1287
Sulfate (mg/L)	348	2090	410
Nitrate (mg/L)	ND (<1)	48	1.7
Calcium	79	459	no analysis
Magnesium	41	305	no analysis
Sodium	229	163	no analysis
Months flowing per year*	<6	10-12	<6

* These are estimated months based on whether a sample was taken or not.

102. The table below shows sampling results from March 1998 at SWM-8, and West ODS 1, 2, 4 and 5. Note the concentrations associated with surface water from SWM-8 is comparable to surface water concentrations from West ODS seeps When these concentrations are compared to pre-mining surface water concentrations from SWM-08, a significant concentration difference is apparent. This demonstrates that ODS seep concentrations are a result of meteoric water percolating through the ODS waste, becoming degraded, and discharging to surface water at SWM-08. These Western ODS sampling locations continue to show impacts as of 2007. As discussed above, ODS seep water is being captured by sumps and concentrations at SWM-08 appear to be returning to background concentrations.

Surface Water and Western ODS Seepage Monitoring Results (March 1998)

Constituents	SWM-8	West ODS-1	West ODS-2	West ODS-4	West ODS-5
TDS (mg/L)	3360	4720	3540	4110	4630
Sulfate (mg/L)	1990	3080	2120	2530	2400
Nitrate as N (mg/L)	34	<0.02	41	11.9	30
Chloride (mg/L)	63	35	51	78	153
Selenium (mg/L)	0.024	<0.001	0.027	0.014	0.041

b. Western ODS Groundwater

103. Groundwater has been impacted by releases from the Western ODS. Well GMW-19 shows approximately a three to six fold increases in TDS, sulfate, nitrate and selenium from pre-mining data, as shown below. The observed changes in monitoring well GWM-19 are similar to the changes in water quality at SWM-8, indicating the source of the water affecting groundwater quality is likely the same. Another change in the water chemistry of GWM-19 is that chloride dropped almost four fold, indicating chloride was diluted by a new source water. This is consistent with leachate coming from a mostly greenstone overburden waste rock, which is low in chloride relative to a phyllite ocean deposit, which is high in chloride. The changes discussed here are typical of mining, which indicates the water sampled from GWM-19 in 2006 and 2007 is leachate from the Western ODS.

Western ODS Groundwater Sampling (GMW-19)

Constituent	GMW-19 1989 average	GMW-19 2006-2007 average
TDS (mg/L)	1113	3122
Sulfate (mg/L)	282	1995
Nitrate (mg/L)	<1 (ND)	6.3
Chloride (mg/L)	189	52
Selenium (ug/L)	<5 (ND)	27

104. The groundwater monitoring system is not adequate for monitoring the 125 acre ODS. The western boundary of the ODS has no groundwater monitoring wells to evaluate groundwater quality. GMW-20 appears to be a side gradient well and GMW-16 is greatly influenced by the North Pit groundwater sink and may be minimally effective at monitoring the northeast edge of the ODS. GMW-19 appears to monitor only the southeast flowing groundwater from the northwestern part of this ODS. Therefore, these WDRs require a lateral and vertical groundwater extent determination in accordance with Title 27 Section 20425 and a plan to fill any data gaps in the groundwater monitoring system.

4. Flotation Tailing Reservoir ODS

105. The FTR ODS is on the facility's eastern side with Littlejohns Creek flowing along its southeastern flank and the FTR on its northwestern side. This ODS received overburden waste rock from Skyrocket Pit and North Pit. This unit has impacted groundwater and surface water as discussed in Findings 78 through 81.

5. Leached Concentrate Residue Facility (WMU #2)

106. The 18-acre LCRF is divided into two portions, which together comprise the Group B waste management unit. Approximately 6 acres of the northern part of the facility encompasses the lined heap leach pile. The remaining 12-acre southern portion, separated by a liner system, impounds the leached concentrate residue (LCR).

107. Liquid in the LCRF was previously classified as Group B mining waste per Title 27 based on expected pH and free cyanide concentrations. Leached concentrates (solids) stored in the LCRF were also classified as Group B mining waste per Title 27 based on a net neutralization potential of 668 tons of $CaCO_3$ equivalent per 1000 tons of ore.

108. The LCRF contains 186,400 tons of leached concentrate residue The LCRF is lined with a two foot thick clay layer installed to a hydraulic conductivity of less than 1 X 10^{-6} cm/sec; a 40-mil Very Low Density Polyethylene (VLDPE) liner; and geotextile layer as a filter layer over the underlying clay.

109. The LCRF has been closed in accordance with Title 27. The Discharger was granted final closure for this unit in a letter dated 28 July 2005. Closure consists of (from top to bottom) a 6-inch thick vegetative soil cover, a one-foot thick FTR tailings layer, a geocomposite drainage layer, and a foundation layer. Surface water improvements have also been incorporated into the final closure cover and consist of a center drainage swale, a breached embankment, and rip-rap spillway.

110. Liquids generated from the LCRF are collected by a LCRS system constructed with a one-foot thick layer of gravel between two geotextiles and a network of perforated pipes. The LCRF/LCRS drains to the lower Process Water Pond (PWP) and is evaporated.

111. Since early 2007, leachate flowed out of the unit and into the LCRS at a rate of approximately 0.03 gpm. This value falls within the range of levels defined as negligible. The most recent RWD proposes to abandon the LCRS by pumping grout in the LCRS pipe system. However, plugging of the LCRS is not acceptable since the drainage will back-up into the waste and cause a head on the liner. This will increase the leakage rate from the unit, causing an impact or threatening to impact groundwater and surface water. Therefore, this Order requires that the Discharger continue to collect and properly dispose of leachate collected in the LCRS.

6. Process Water Pond (WMU #3)

112. Liquid stored in the PWP was previously classified as Group A mining waste based on hazardous concentrations of copper and cyanide. The PWP contains 39,000 cubic yards of flotation tailings. The base liner system (from bottom to top) consists of a two foot thick layer of clay, a 150-mil geotextile, an 80-mil HDPE geomembrane, a 150-mil geotextile, a one foot thick layer of crushed and washed rock, a 150-mil geotextile, and an 80-mil HDPE geomemebrane.

113. The sideslope liner system (from bottom to top) includes a 150-mil geotextile, an 80-mil HDPE geomembrane, and HDPE drain net, and an 80-mil HDPE geomembrane.

114. During the summer and fall of 1999, the Discharger completed an interim closure of the PWP, which consisted of evaporation of wastewater in the PWP to approximately 8 acre-feet, solidification of this remaining brine by placing flotation tailings into the PWP, covering the solidified brine with an impervious liner to prevent contact between rainfall and the underlying materials, and construction of a small (1.3 acre) evaporation pond on the lined surface to collect and evaporate the LCRF/LCRS flows.

115. In its most recent RWD, the Discharger proposes to replace clean closing the PWP with an in-place closure. In-place closure requires reducing the amount of all free-liquids and placing a cap designed in accordance with Title 27. The in-place design was submitted to staff as Amendment No. 2 of the RWD (dated June 2007).

116. Amendment No. 2 proposes an in-place closure because no active WMUs are available to dispose of materials from the PWP. The Discharger has stated that reopening the LCRF to place new waste material could affect the integrity of the Title 27 cover system and could also adversely affect the surface drainage pattern.

117. In a letter dated 15 August 2007, staff requested additional information to supplement Amendment No. 2 to quantify the proposed in-place closure of the PWP. A Technical Memorandum, dated 20 August 2007, provides the additional information requested by staff. The memorandum addresses the requirements of Title 27 Section 21400(b)(1) and evaluates the infeasibility of the clean closure option using EPA's "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA," OSWER Directive No. 9355.3-01. The methodology screened and evaluated five alternatives for closing the PWP.

118. The analysis indicates that in-place closure was the highest scoring alternative. In-place closure will provide protection of the environment by keeping the waste encapsulated in a cell that meets current Title 27 requirements.

119. The in-place closure of the PWP will be constructed per Title 27 Section 21090(a)(1)(2)(3)(A)(1)(a-d) as follows (from bottom to top):

- An engineered fill/foundation layer as needed to reach the elevation of the base grading plan (thickness not provided in RWD). The engineered fill and foundation layer will consist of material borrowed from same source and shall be placed in accordance with Title 27, Section 21090(a)(1) which states a "closed landfill shall be provided with not less than two feet of appropriate materials as a foundation layer for the final cover." This Order requires the the Discharger to provide appropriate laboratory documentation identifying the soil type and appropriate engineering properties making it suitable for the proposed design;

- A 60-mil high-density polyethylene (HDPE) geomembrane, except under the footprint of the evaporation pond where a 100-mil HDPE geomembrane will be used. The HDPE will serve as a low-hydraulic-conductivity layer in accordance with Title 27, Section 21090(a)(2);

- A geocomposite drainage layer; and

- An erosion/vegetative layer a minimum of one foot thick. The preliminary cover design does not describe the physical characteristics of the erosion layer and it is unclear whether the underlying erosion layer can sustain vegetation. The design calls for 1.5 foot vegetative cover. This thickness complies with Title 27, Section 21090(a)(3)(A)(1).

120. These WDRs approve the in-pace closure of the PWP, based on the RWD and Addendum No. 2 (with supporting documentation).

a. LCRF and PWP Surface Water

121. Surface water that is in contact with the LCRF is controlled by a graded surface that drains to a perimeter run-on diversion ditch. Surface water monitoring point SWM-11, located at the northern end of the LCRF, has been monitored since 1991. Surface water flow has not been recorded in SWM-11, and consequently, the LCRF and PWP are not causing surface water impacts.

b. LCRF and PWP Groundwater

122. Groundwater near the LCRF and PWP is monitored by upgradient well GWM-3. The LCRF is monitored downgradient by wells GWM-24. The PWP is monitored by downgradient well GWM-25. Additional wells installed further south of the PWP are also considered as downgradient monitoring points, which include GWM-4 through GWM-6, and GWM-15. GWM-3, GWM-24, GWM-25 were installed in the phyllite. GWM-4, GWM-5, and GWM-15 are greenstone wells.

123. Upgradient groundwater is represented by GWM-3, a phyllite well. TDS has ranged between 210 and 310 mg/l; sulfate has ranged between 4.0 and 29 mg/L; sodium has ranged between 9.4 and 62.2 mg/L; calcium has ranged between 9.4 and 69.8 mg/L; and bicarbonate has ranged between 164 and 488 mg/L.

124. Groundwater from GWM-24 is downgradient of the LCRF and shows water quality changes from mining. TDS has ranged between 300 mg/L to 860 mg/L. The highest TDS concentrations have been reported in the last three sampling events. Sulfate concentrations have ranged between 63 mg/L and 370 mg/L. The highest sulfate concentrations have been reported in the last two sampling events. Sodium has ranged between 21.1 and 89.4 mg/L; calcium has ranged between 42.1 and 160 mg/L, and bicarbonate concentrations have ranged between 172 and 321 mg/l**.** GWM-24 has reported post-mining exceedences of TDS, nickel, and sulfate**.** Arsenic also appears to be increasing in GWM-24 since July 2002. Arsenic concentrations have ranged between 0.0007 and 0.0086 mg/L.

125. Groundwater from well GWM-25 is collected downgradient of the PWP. TDS concentrations have ranged from 440 to 2,140 mg/L; sulfate has ranged between 89 and 1,040 mg/L; sodium has ranged between 22 and 57.1 mg/L; calcium has ranged between 99 and 506 mg/L; and bicarbonate concentrations have ranged between 208 and 559 mg/L. The highest concentrations were after mining has started and are impacts related to mining. Post-mining exceedences have been reported for Nitrate and pH in well GWM-25.

126. Groundwater near wells GWM-4 through GWM-6 were evaluated. TDS concentrations have ranged between 150 and 1,410 (GWM-5) mg/L; sulfate concentrations have ranged from 21.3 to 521 (GWM-5) mg/L; sodium concentrations have ranged from 8.3 to 54.6 (GWM-5) mg/l; calcium ranged between 46.8 and 325 (GWM-5) mg/L; and bicarbonate concentrations have

ranged from 171 to 381 (GWM-5) mg/L. Although constituent concentrations vary between the three wells, it is apparent that GWM-5 has been affected by releases from the LCRF and PWP.

127. The LCRF and PWP have impacted groundwater quality. The corrective action for these impacts is closure of both of these units per Title 27. The LCRF has been closed per Title 27 and PWP closure plan complies with Title 27. The implementation of the PWP closure plan has already started and will be completed in the year 2018.

7. Skyrocket Pit Lake

128. From September 1993, when the mining of Skyrocket Pit ceased, until April 1999, Skyrocket Pit was a hydraulic sink, containing poor quality groundwater from the west and good quality water from the east. Although the combined groundwater flowing into Skyrocket Pit has concentrations of some constituents of concern which exceed water quality objectives, Skyrocket Pit was previously classified as a Group C mine WMU since these constituent concentrations were naturally occurring.

129. In November 2004, the Discharger proposed revisions to its Storm Water Pollution Prevention Plan (SWPPP) to cover the winter discharges under its NPDES General Storm Water Permit. In March 2005, staff responded that the discharge of ODS spring water to surface waters cannot be covered by the General Permit. By letter dated 29 November 2005, the Discharger stated that its existing ODS recirculation systems may pose a threat to water quality when operated in conjunction with severe wet weather conditions.

130. On 2 February 2007, the Executive Officer signed Time Schedule Order (TSO) No. R5-2006-0900. The TSO was requested by the Discharger "to transfer captured seepage water from the Overburden Disposal System ("ODSs") to Skyrocket Pit Lake both to protect water quality and to provide a means of gathering specific data in support of Meridian's submitted NPDES permit application and proposed permanent revisions to the WDRs in connection with that application." The Discharger informed the Regional Water Board that it would begin this transfer on or about 10 December 2005 depending on weather conditions. .

131. The three ODS springs contain elevated concentrations of sulfate, selenium, nitrate and TDS relative to Skyrocket Pit Lake as shown below:

Discharge Concentrations to Skyrocket Pit Lake

		Gold Knoll	West ODS2	West ODS5	Skyrocket Pit Lake
Constituent	Units	Median 2004-2005	Median 2006-2007	Median 2006-2007	Median 2006-2007
TDS	mg/l	7,406	3,557	4,378	2,615
Sulfate	mg/l	5,520	2,150	2,150	1,013

Nitrate	mg/l	30	18	8.8	2.6
Selenium	ug/l	70	18	28	9

132. The transfers of captured spring flows were halted in April 2006 since heavy rains and transfers caused the pit lake to encroach on the freeboard elevation required by WDRs No. 5-01-040. This condition agrees with the modeled water level presented in the 17 October 2005 RWD.

133. To alleviate the lack of freeboard in Skyrocket Pit, the Discharger initiated a contingency plan that included transferring Skyrocket Pit Lake water to North Pit Lake and constructed enhanced evaporation systems (i.e. floating spray system and Turbomister) on Skyrocket Pit Lake and North Pit Lake. The pit lake level dropped relatively rapidly once the transfers were stopped and the contingency measures were implemented.

134. Due to the short transfer period, chemical changes to Skyrocket Pit Lake water are difficult to discern. The April 2007 report suggests the only noticeable changes are decreases of nitrate and possibly nickel. Nitrate was predicted to decrease due to primary production in the pit lake. The change in nickel may be related to analytical variability. Selenium appears to have increased during the transfer period.

135. In accordance with the TSO, continuous flow data for specific locations were to be recorded and evaluated for Gauge Station #2 (TSWM-1), #3 (SWM-15), #5 (SWM-10), and #6 (SWM-16). However, the April 2007 report does not provide continuous flow data for Guage Station #2 (TSWM-1) or #3 (SWM-15). TSWM-1 is located below the confluence of Littlejohns Creek and Littlejohns Creek Diversion. This location is critical to evaluating total surface water flows discharging from the site. SWM-15 is a critical location to evaluate flows of the mid to upper reaches of Littlejohns Creek Diversion south of the confluence of Underwood Creek.

136. Flow data does not exist during the transfer period for Love Pond Spring and was only recorded for SWM-6 during February and March 2006. However, flow data was recorded during the transfer period for SWM-15, downstream of SWM-6 and SWM-16. Flow data presented in the April 2007 report indicates that a greater percentage of flow recorded at SWM-15 is from seepage of Skyrocket Pit Lake water. Continuous flow data for SWM-16 is presented following the transfer period, however, all flow is attributed to Love Pond Springs.

137. The April 2007 report did not evaluate surface water quality changes during the transfer period for SWM-12 through SWM-15, nor does analytical data exist for these monitoring locations. Analytical data does not exist for SWM-17 either.

138. The April 2007 report evaluates constituents of concern over time for SWM-02, SWM-06, SWM-10 and SWM-16. Analytical data does not exist for SWM-16 prior

to or during the transfer period. Since no pre-transfer or transfer data exists for SWM-16, concentrations of several COCs appear elevated when compared to SWM-02, SWM-06, and SWM-10. These COCs include TDS, sulfate, arsenic, selenium, and nitrate. All flow recorded at SWM-16 after the transfer period is attributed to Love Pond Springs.

139. Other increases of COCs were evident during and following the transfer period at SWM-02 (sulfate, nitrate, TDS) and SWM-10 (sulfate, nitrate, TDS).

140. As described in Finding No. 132, during the transfer period Skyrocket Pit Lake rose approximately 2 feet to a maximum elevation of 969.88 feet MSL. According to Figure 6 of the most recent RWD, water levels in well PZ-4 mirrored water levels of Skyrocket Pit Lake, indicating that this pit lake influences groundwater gradients along the southeastern shore. Groundwater in the vicinity of well GWM-12 also appears to have risen slightly during the transfer period. Historically, groundwater elevations at GWM-12 are approximately 8 feet lower than Skyrocket Pit Lake levels.

141. Prior to the transfer period, groundwater elevations measured in well GWM-20 (west of Skyrocket Pit Lake) were higher than water levels of Skyrocket Pit Lake. During the transfer period, water levels in the lake increased above GWM-20 reversing groundwater flow toward the west. However, groundwater elevations in GWM-20 did not experience a significant rise compared to lake levels and subsequent measurements indicate a relatively consistent groundwater elevation in GWM-20. Chemically, groundwater in GWM-20 appears to be phyllite type water and is likely isolated from Skyrocket Pit Lake.

142. The water level at Skyrocket Pit Lake appears to influence the groundwater levels at several monitoring wells, and the groundwater gradients in those areas. Wells GWM-36A/B are located northeast of Pit Lake. The wells were constructed between the Pit Lake and Littlejohns Creek Diversion. According to Figure 6 of the RWD, groundwater elevations of wells GWM-36A/B following the transfer period, track the decreasing water levels of the Pit Lake. However, when groundwater elevations of GWM-30 (northeast of GWM-36 A/B) are compared to Pit Lake levels during the transfer period, it appears groundwater elevations remain higher than water levels of the Pit Lake and that groundwater flows toward wells GWM-36A/B. This is consistent with historical data.

143. When chemical data of wells GWM-36A/B is compared to well GWM-30, it appears that groundwater near well GWM-36A/B is dominated by flow from GWM-30 area. Chemically, the groundwater constituents concentrations are similar as would be expected. Groundwater in well GWM-36A has higher concentrations of same COCs as GWM-36B. However, GWM-36B is a shallow well that is likely influenced by surface water infiltration.

144. Groundwater gradients influenced by transfers of captured spring flows from the ODSs to Skyrocket Pit Lake seem to be limited to select wells located east and

southeast of the Pit Lake. During the transfer period, there could have been some possible influence toward the northeast but this extent was also limited.

145. Transfers into Skyrocket Pit Lake resumed in December 2006. The 2006/2007 wet season was drier than normal and the risk to overtopping decreased. During the 2006/2007 wet season, a net of 25.7 acre-feet was transferred into Skyrocket Pit Lake.

146. On 6 February 2007, the Executive Officer signed TSO No. R5-2007-0900 addressing possible wet weather discharges from Skyrocket Pit Lake to Littlejohns Creek. TSO No. R5-2007-0900 superceded TSO No. R5-2006-0900. To permanently reduce the lake level to the proposed operating level, the Discharger has submitted a National Pollution Discharge Elimination System (NPDES) permit application.

147. To control overtopping and lessen the dry season discharge of pit lake water to Littlejohns Creek Diversion, the Discharger has proposed a Skyrocket Pit Lake operating level between 955 and 960 feet MSL. This proposed operating level is based on field observations of gradients, water quality, and flows. The Discharger proposes to refine the maximum operating pit levels within the first years of operation (2008 through 2010), as the proposed NPDES discharges are undertaken. The proposed operating level of 955 to 960 feet MSL is mainly to prevent discharges to Littlejohns Creek Diversion and does not fully consider discharges to groundwater and surface water downgradient of pit lake dam. Also, the proposed discharge is a temporary solution because the Discharger's model shows that pit lake constituents will become too concentrated for future NPDES discharges using dilution as the treatment method.

148. Skyrocket Pit Lake is a mine pit now filled with groundwater, precipitation, water from the Flotation Tailings Reservoir, and water from the ODSs. Because the Discharger is currently discharging Group B waste into pit lake, the pit lake is required to be managed as a Group B mining unit. Since the threat to water quality exists from a discharge from Skyrocket Pit Lake, these WDRs require the Discharger to contain the Group B waste stored in the pit lake, unless authorized by Regional Water Board in a companion Order.

8. North Pit Lake

149. North Pit Lake is not a classified waste management unit and no further closure action is proposed in the RWD or required by this Order. North Pit Lake has reached an equilibrium level of 1030 feet MSL.

FACILITIES AND GENERAL SITE CLOSURE PLANS

150. Most of the facilities in the Administration Building area will be retained for use during the closure and postclosure period, and for future alternative land uses. The area includes an administration building, parking lot, guard shack, fencing, aboveground power lines, aboveground water storage tanks, buried water lines,

underground telephone and utility lines, and sewage disposal facilities.

151. The plant area included a heavy equipment maintenance shop, ore crusher and conveyer, beneficiation plant, mill office and metallurgical laboratory, explosives storage area, fuel storage area, access and haul roads, fencing, aboveground utility and communication lines, underground water lines, underground utility and communication lines, sewer disposal facilities, and electrical substation. The mill building, its contents and associated equipment have been dismantled and removed down to the concrete foundation. The machinery, tanks, products and miscellaneous structures have been removed from the plant area for reuse elsewhere. Inert materials have been recycled offsite or will be disposed on site in the designated inert material disposal area in the FTR. Other materials such as tanks, conveyors, motors, and pipes have been transported offsite for reuse.

152. The majority of the site area including the access roads, haul roads, the disturbed areas adjacent to the pits, the WMUs and the plant area will generally be reclaimed while certain access roads will be left in place for potential future long-term uses.

153. Concrete foundations will remain in place, be cleaned, and covered with a minimum of two feet of overburden material. Utilities such as power and telephone lines will be removed for offsite recycling or disposal.

154. The plant area and the disturbed areas adjacent to the plant area, the Administrative Building area parking lot and other disturbed areas will be graded to drain towards either natural drainage courses or site drainage ditches that will be constructed.

155. Mine revegetation/habitat restoration modes are identified in the closure plans. They include revegetation of pit slopes above the final pit lake levels, pit lake habitat enhancement, revegetation of the FTR and LCRS areas, revegetation of serpentine exposure areas, re-establishment of wildlife habitat surrounding the pit areas, and maintenance of the wetland ponds that have been created in the Littlejohns Creek diversion.

Postclosure Maintenance

156. Postclosure surface water monitoring will begin when the FTR and LCRF/PWP have been certified closed and reclaimed. The sampling locations, constituents of concern, and frequency of monitoring during the postclosure maintenance period may be reduced to a semi-annual basis at each station after constituent loads are found to be in the same range as pre-project conditions.

157. The closure period for each ground water monitoring point ends when each waste management unit is reclaimed, certified closed and a determination is made by the Regional Water Board that there is no longer a threat to water quality.

158. Surface and ground water monitoring stations will be maintained during the postclosure maintenance period until there is no longer a threat to water quality.

Postclosure Land Use

159. As indicated in the Mine Use Permit and Reclamation Plan, the reclaimed mine site will be suitable for wildlife habitat, range, and firewood resource.

160. The pit lakes may be utilized for fishing depending upon the final water quality and the result of habitat suitability evaluations. There is the potential that portions of the area can be used for residential properties and industrial activities.

161. Access roads to key points within the main site area will remain. The two pit lake areas will be fenced and signs will be posted to prevent trespasser access. The closed LCRF/PWP will also be fenced and posted to limit access and possible damage to the cover.

162. Deed restrictions will be attached to the property to prevent unacceptable land uses and to assure the integrity of the waste management units.

Erosion Control and Reclamation Plans

163. The Discharger is implementing an erosion control and reclamation plan subject to these waste discharge requirements, the requirements of the Surface Mining and Reclamation Act of 1975 (SMARA), the annual SMARA reporting requirements of §2207 of the Public Resources Code, and Title 14, CCR, Chapter 8, Subchapter 1, Article 1.

FINANCIAL ASSURANCES

164. The Discharger has provided financial assurances in the form of an irrevocable Letter of Credit in the amount of $3.302 million for the closure and postclosure maintenance of the facility. The cost estimate for the closure and post-closure maintenance was based on a 1988 estimate which included $310,000 for capping the amount of low-grade ore and overburden mined as of 18 November 1988 to Group B mine WMU standards.

165. In accordance with Title 27, Section 22510(f), the Discharger shall provide for adequate funding to pay for the costs of closure and post closure maintenance. These WDRs require the Discharger to update the Financial Assurances.

CEQA CONSIDERATIONS

166. In January 1988, the Calaveras County Planning Commission adopted a Final Environmental Impact Report (EIR), in accordance with the California Environmental Quality Act (Public Resources Code Section 21000, et seq.) and

State guidelines. The project may have the following significant impacts on water quality: (a) contaminated runoff and leachate could impact surface and ground water; (b) mining and construction activities could cause siltation of surface waters. Calaveras County has approved a general plan of development for the project and has issued a Use Permit for the project.

167. The Regional Water Board has reviewed the EIR. Compliance with these waste discharge requirements will mitigate or avoid the significant impacts on water quality in the following manner: (a) The threat of surface and ground water degradation from contaminated runoff and leachate will be mitigated by construction of the facilities; and (b) Siltation of surface waters from mining and construction activities will be mitigated by implementing the erosion control and reclamation program.

168. The Regional Water Board adopted a negative declaration for the treatment and transfer of LCRF/PWP to FTR and the transfer of FTR fluids to the Skyrocket Pit on 4 August 1994 in accordance with the California Environmental Quality Act (Public Resources Code Section 21000, et seq.), and Title 14, CCR, Section 15301. Based on information at the time, the Regional Water Board found this project would not have an adverse effect on the environment. Modeling conducted in 1994 by the Discharger on water levels in Skyrocket Pit indicated the pit would not overtop and pit water would not migrate out of the pit at a significant rate. Since then the water level in Skyrocket Pit has increased significantly above the predicted 940-foot water elevation and seepage from the pit has increased flows and concentrations of sulfate and TDS in the Littlejohns Creek Diversion. However, the requirements of this Order and the companion NPDES Order should negate these impacts.

OTHER LEGAL REFERENCES

169. This Order implements:

- the Water Quality Control Plan, Fourth Edition, for the Sacramento River Basin and the San Joaquin River Basin, and

- the prescriptive standards and performance goals of Title 27, California Code of Regulations, Division 2, Subdivision 1, effective July 1997, and subsequent revisions.

170. The Regional Water Board has notified the Discharger and interested agencies and persons of its intention to prescribe waste discharge requirements for this discharge and has provided them with an opportunity for a public hearing and submittal of their written comments and recommendations.

171. In a public hearing, the Regional Water Board heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED pursuant to Sections 13263 and 13267 of the California Water Code, Order No. 5-01-040 is rescinded and Royal Mountain King Mine, Meridian Beartrack Company, Meridian Gold Company, and Felix Mining Company, in order to meet the provisions of Division 7 of the California Water Code and the regulations adopted thereunder, shall comply with the following:

A. PROHIBITIONS

1. The discharge of ‘hazardous waste’, ‘designated waste’, ‘Group A’ and ‘Group B’ mining waste unless otherwise specified in these WDRs is prohibited. For the purposes of this Order, the terms ‘hazardous waste’, designated waste’, ’Group A’ and ‘Group B’ mining waste are as defined in Division 2 of Title 27 of the CCR.

2. The discharge of solid waste or liquid waste to surface waters, surface water drainage courses, or groundwater is prohibited except as specified by this Order and as described in NPDES Order No. ________.

3. The discharge of wastes outside of a waste management unit or portions of a waste management unit specifically designed for their containment is prohibited.

4. The discharge of wastes to the FTR and LCRF is prohibited.

5. The discharge of waste into Skyrocket Pit Lake except as specified by this Order is prohibited.

B. DISCHARGE SPECIFICATIONS:

General Specifications

6. Wastes shall only be discharged into, and shall be confined to, the waste management units (WMUs) specifically designed for their containment.

7. The treatment or disposal of waste shall not cause pollution or a nuisance as defined in the California Water Code, Section 13050.

8. The discharge of wastes shall not cause water quality degradation by allowing a statistically significant increase over background or baseline concentrations.

9. Waste materials shall be confined to the waste management units designated for that waste as shown on Attachment B except as specified by this Order.

10. All drains within the PWP and LCRF, as well as the associated LCRSs, shall remain open and free flowing. Any mining waste collected in these drains and LCRSs shall be contained and disposed of in a manner allowed by Title 27 and these WDRs..

11. Liquid detected in an LCRS shall be measured, sampled and returned to the waste management unit that it came from or otherwise managed in accordance with Regional Water Board approved methods.

12. Detection of any processing chemicals or breakdown products, which are not naturally occurring at any point outside of the disposal facilities shall constitute a violation of this Order.

Protection From Storm Events

13. All waste management units shall be designed, constructed and operated to prevent inundation or washout due to flooding events with a 100-year return period.

14. All waste management units' precipitation and drainage control systems shall be designed, constructed and maintained to accommodate the anticipated volume of precipitation and peak flows from surface runoff under 25-year, 24-hour precipitation conditions.

15. Annually, prior to the anticipated rainy season, any necessary erosion control measures shall be implemented, and any necessary construction, maintenance, or repairs of precipitation and drainage control facilities shall be completed to prevent erosion or flooding of the site.

16. To comply with federal regulations for stormwater discharges promulgated by the U.S. EPA, the Discharger shall seek coverage under the State Water Board's Water Quality Order No. 97-03-DWQ, and shall conduct the monitoring and reporting as required therein.

17. During closure and post-closure maintenance, the following shall be complied with: (a) erosion control and surface flow containment facilities shall be constructed and maintained to prevent siltation of surface waters; (b) all exposed cuts and fills shall be compacted, reseeded, and adequately watered to initiate and sustain plant growth as soon as practicable, (c) disturbed areas of roadway shall be water barred as necessary and drained onto undisturbed areas with erosion control; (d) there shall be no removal of vegetation nor disturbance of natural soil conditions except where measures that will prevent erosion discharge to surface waters or storm drainage systems are installed and operational prior to 15 November annually or where measures are installed and operational prior to the removal or disturbance; and (e) the Discharger shall submit for approval by **15 October** annually, an erosion control plan and the annual mining reclamation report pursuant to SMARA regulations.

PWP, LCRF and FTR Specifications

18. There shall be no permanent ponding of any liquid on top of the leached concentrates in the LCRF or the FTR. Any water that has contacted the leached

concentrates of the LCRF shall be contained in PWP.

19. Surface drainage from diverted tributary areas shall not contact FTR, LCRF, or PWP mining waste.

20. Leachate generation in LCRF and PWP shall not exceed 1,000 gpm or 2000 gpd. If leachate exceeds these values, then the Discharger shall notify the Regional Water Board in writing within seven days. Notification shall include a reassessment of the leak's impact on the integrity of the lower liner, and timetable for remedial action. The Regional Water Board may require repair of the inner liner of the impoundment or other action necessary to reduce or eliminate leachate production.

21. Measures shall be taken to assure that unauthorized persons and animals are effectively excluded from LCRF and PWP.

22. The Discharger shall test the PWP and LCRF LCRSs at least annually to demonstrate proper operation.

23. The in-place closure of the PWP will be constructed as follows (from bottom to top):
    - Placement of engineered fill/foundation layer as needed to reach the elevation of the base grading plan. The engineered fill shall be not less than two feet of appropriate materials as a foundation layer for the final cover. The Discharger shall provide appropriate laboratory documentation identifying the soil type and appropriate engineering properties making it suitable for its proposed design prior to final design approval from the Regional Water Board;
    - A 60-mil high-density polyethylene (HDPE) geomembrane (except under the footprint of the evaporation pond where a 100-mil HDPE geomembrane will be used);
    - A geocomposite drainage layer;
    - An erosion/vegetative layer a minimum of one foot thick of soil which:
        a. Contains no waste (including leachate);
        b. Is placed on top of all portions of the low-hydraulic conductivity layer ;
        c. Is capable of sustaining native, or other suitable plant growth;
        d. Is initially planted - and is later replanted as needed to provide effective erosion resistance with native or other suitable vegetation having a rooting depth not exceeding the depth to the top of the low-hydraulic-conductivity layer.

Skyrocket and North Pit, and ODSs Specifications

24. Leachate generated by any ODS may be captured and discharged into Skyrocket Pit.

25. Surface drainage from diverted tributary areas shall not contact the overburden disposal units, low grade ore stockpile areas, Skyrocket Pit, or North Pit.

26. The surface elevation of Skyrocket Pit Lake shall be operated at the proposed 955 to 960 msl or lower, as necessary, to create a groundwater sink.

Waste Management Unit Construction

27. Measures shall be taken to ensure that synthetic liners are not punctured for the period during which the waste/processing material contained therein poses a threat to water quality.

28. The LCRSs shall be designed, constructed, and maintained to collect twice the anticipated daily volume of leachate generated by the WMU and to prevent the buildup of hydraulic head on the outer liner at any time. The depth of fluid in PWP LCRS sump shall be kept at or below one-foot.

29. Caps over any Group B Mining Waste shall have a maximum hydraulic conductivity of <1 x 10-6 cm/sec unless otherwise specified and a minimum relative compaction of 90 percent. Hydraulic conductivities shall be determined through laboratory tests confirmed by field testing of the actual cap. Construction methods and construction quality assurance procedures shall be sufficient to insure that all parts of the cap meet the hydraulic conductivity and compaction requirements.

30. The Discharger shall submit for approval, a Construction Quality Assurance (CQA) Plan at least 90 days prior to any WMU containment construction.

Supervision and Certification of Construction

31. WMUs shall be designed and constructed under the direct supervision of a California registered Civil Engineer or a Certified Engineering Geologist and shall be certified by that individual as meeting the prescriptive standards and performance goals of Title 27 prior to waste discharge.

Waste Management Unit Closure Specifications

32. WMUs shall be closed according to an approved closure and post-closure maintenance plan which implements §22510 of Title 27.

33. The closure and post-closure maintenance plan shall provide for continued compliance with the applicable standards of Title 27 for waste containment, precipitation and drainage controls, and monitoring throughout closure and the postclosure maintenance period.

34. Closed WMUs shall be provided with at least two permanent monuments, installed by a licensed land surveyor, from which the location and elevation of all wastes, containment structures, and monitoring facilities can be determined throughout the postclosure maintenance period.

35. Closed WMUs which require caps shall be graded as described in these WDRs and maintained to prevent ponding and promote revegetation.

36. Closed areas with slopes greater than 10%, surface drainage courses, and areas subject to erosion by wind or water shall be designed and constructed to prevent erosion.

D. FINANCIAL ASSURANCE

1. Beginning 30 April 2008, and thereafter by 30 April each year, the Discharger shall establish cost estimates for initiating and completing corrective action for all known or reasonably foreseeable releases from the mine site, and submit these estimates for review and approval to the Regional Water Board. In addition, the Discharger shall obtain and maintain assurances of financial responsibility for initiating and completing such corrective action for all known or reasonably foreseeable releases from the mine site in the amount approved by the Regional Water Board, as submitted in the Discharger's cost estimates. If the Regional Water Board determines that either the amount of coverage or the mechanism is inadequate, then within 90–days of notification, the Discharger shall submit an acceptable mechanism for at least the amount of the approved cost estimate.

2. The Discharger is required to maintain financial assurance mechanisms for post-closure maintenance cost as specified in Chapter 6 of Title 27. The Discharger is required to submit the financial assurance mechanism for post-closure maintenance to the Regional Water Board. If the Regional Water Board determines that either the amount of coverage or the mechanism is inadequate, then within 90 days of notification, the Discharger shall submit an acceptable mechanism for at least the amount of the approved cost estimate.

3. By 1 June 2008, submit a post closure maintenance cost estimate and mechanism for the PWP and LCRF. Within 90 days of staff approval, show it has been funded.

4. By **1 June 2008**, the Discharger shall provide proof to the Board that the deed to the mine facility property, or some other instrument that is normally examined during a title search, has been modified or recorded to include, in perpetuity, a notation to any potential purchaser of the property stating that:

   a) The parcel has been used as a mine site;

   b) Group A, Group B, and Group C mine waste, has been discharged at this site;

   c) Use options for the parcel are restricted in accordance with the post-closure land uses set forth in the post-closure plan and in WDRs for the mine site;

   d) In the event that the Discharger defaults on carrying out either the post-closure maintenance plan or any corrective action program needed to address a release, then the responsibility for carrying out such work shall fall to the property owner; and

   e) The notation must be approved by the Regional Water Board.

5. The Discharger shall update the final Post-Closure Maintenance Plan any time there is a change that will increase the amount of the post-closure maintenance cost estimate. The updated final Post-Closure Maintenance Plan shall be

submitted to the Regional Water Board. The updated final PCMP shall meet the requirements of Title 27 CCR §21769(b), and include an estimate of the cost of carrying out all actions necessary to carry out the first thirty years of post-closure maintenance.

PROVISIONS:

1. The Discharger shall comply with the Standard Provisions and Reporting Requirements, dated September 2003, which are hereby incorporated into this Order. The Standard Provisions and Reporting Requirements contain important provisions and requirements with which the Discharger must comply. A violation of any of the Standard Provisions and Reporting Requirements is a violation of these waste discharge requirements.

2. The Discharger shall comply with Monitoring and Reporting Program No.________, which is attached to and made part of this Order. This compliance includes, but is not limited to, maintenance of waste containment facilities and precipitation and drainage controls and the monitoring of groundwater, the unsaturated zone, and surface waters throughout the active life of the waste management units and the post-closure maintenance period. A violation of Monitoring and Reporting Program No. ________ is a violation of these waste discharge requirements.

3. The Discharger shall comply with the notification requirements of §21710(c) of Title 27.

4. These requirements are conditional upon receipt of all local and state permits for the project and are not intended to limit or reduce any obligations or requirements, which are imposed by any other authority having jurisdiction regarding the Project.

5. The Discharger must comply with all conditions of this Order including timely submittal of technical and monitoring reports as directed by the Executive Officer. Violations may result in enforcement action, including Regional Water Board or court orders requiring corrective action, imposition of civil monetary liability, or revision or rescission of this Order.

6. The Discharger shall complete the tasks contained in these waste discharge requirements in accordance with the following time schedule. Reports shall be prepared by a registered professional, as required by provision E.7.

   a) By **1 February 2008**, the Discharger shall submit a Groundwater Evaluation Monitoring Report that evaluates where data gaps exist in defining the lateral and vertical extent of groundwater pollution, and in particular shall address the data gaps identified in Findings 31, 101 and 106. This report shall include a proposal to install a minimum of two additional monitoring wells within the FTR waste approximately 600 feet northeast and 1,400 feet southwest of FPZ-1A/1B. This report shall also include:
      i) An evaluation of all groundwater monitoring locations and a determination whether the construction of each well is adequate for its designated purpose. For example, if a well is a detection monitoring well at the point of compliance, does the screen cross the water table and is the pump properly located to sample first groundwater?
      ii) Which monitoring wells should be destroyed because they are not filling a data need or are redundant wells?
      iii) The report should contain a work plan proposing new well locations to fill the identified data gaps and wells to be destroyed (if any).
      iv) The work plan shall include the information listed in the first section of Attachment D, “Requirements for Monitoring Well Installation Workplans and Monitoring Well Installation report of Results”.

   b) By **1 March 2008**, the Discharger shall submit a Surface Water Evaluation Monitoring Report that evaluates where data gaps exist in the surface water monitoring system. This report shall include a map of all springs (historic and current) at the facility. This would include natural springs and springs that developed during or after mining. Each spring should be identified whether the spring was a known spring before mining or was identified after mining was started. The report shall include the surveyed creek bed elevation of Littlejohns Creek Diversion from SWM-06 through SWM-10. The creek bed elevation should be measured relative to mean sea level adjacent to the Gauge Stations located within Littlejohns Creek Diversion.

   c) By **1 March 2008,** the Discharger shall submit a FTR Assessment Report discussing the proposed FTR model and whether current conditions of the unit meet the requirements of Title 27 for an Engineered Alternative. The report shall include a definitive discussion supported by scientific data and reasoning that current conditions associated with the FTR comply with Title 27, are protective of water quality, and are protective of the environment.

This report shall include an evaluation of the leakage rate from the unit, the hydrogeology of the unit and surrounding groundwater, and information regarding whether leachate has reached the unit's surface and discharged to surface water. If the report concludes that the current unit does not meet the conditions for an Engineered Alternative pursuant to T27, then the report shall include a proposal and timelines for activities to bring the FTR into compliance.

d) By **1 March 2008,** the Discharger shall submit a Capture Zone Model workplan for Skyrocket Pit Lake. This groundwater model shall be based on site data and determine what pit lake elevation is appropriate for containing degraded groundwater and surface water on site (The containment elevation will likely be different for groundwater and surface water). The model must predict how lowering Skyrocket Pit Lake will affect Love Pond Spring and surrounding groundwater. The model should incorporate normal and above/below normal wet seasons and predict how that will affect discharges from Skyrocket Pit Lake, Love Pond Spring, and Littlejohns Creek diversion flows. This report must also evaluate data needs to physically demonstrate the capture area of Skyrocket Pit Lake. A schedule shall be provided for the construction of any monitoring locations. The report shall also include proposed sampling frequencies and parameters.

e) By **30 July 2008**, the Discharger shall submit a groundwater closure strategy report for the entire mine site. This report shall evaluate methods for containing waste onsite or other regulatory methods to achieve compliance such as a Basin Plan Amendment or Containment Zone, and shall give a proposed schedule for completing any necessary studies or submitting required documents to the Regional Water Board.

f) By **30 August 2008**, the Discharger shall submit a Monitoring Installation Report on all new groundwater and surface water monitoring points described in Surface Water and Groundwater Evaluation Monitoring Reports. The first round of groundwater sampling shall take place during the third quarter 2008 sampling period. The sampling data and evaluation of that data shall be reported in the third quarter 2008 monitoring report required by Monitoring and Reporting Program No. ______________. Shall include the info required by the second section of Attachment E.

g) By **1 April 2010**, a Capture Zone Analysis Report shall be submitted illustrating the area of capture based on the Capture Zone Model Report proposed sampling data results. The measured capture area shall be compared to the groundwater model in the Capture Zone Model Report. A determination shall be made on what Skyrocket Pit Lake level is most appropriate for containing groundwater and preventing discharges to surface water. This report shall also include evaluation of the data collected per the FTR Assessment Report and Work Plan and whether the model presented in that report is supported by the data. A determination is required if the current state of FTR is threat to water quality

h) By **30 July 2010**, the Discharger shall submit a comprehensive closure plan that combines all components of closure of individual units (LCRF, PWP. FTR, Skyrocket Pit Lake, FTR-ODS, Western ODS, and Gold Knoll ODS) and how the closure of these units manages all discharges of mine-polluted water as a final site wide solution or management plan. The final closure plan and implementation of its components must comply with Title 27 Section 22510. This closure plan must include findings with explanations (supported by data) of how each unit complies with the prescriptive or the performance standards of Title 27. If the chosen closure of any unit or the site wide plan is different then the prescriptive standard of Title 27, findings must be included detailing how the closure complies with Title 27 Section 20080 (2)(A-B)(engineered alternative). These findings must be supported by data and engineered designs. Alternative closure options such as containment zone and basin plan amendment shall be considered.

i) Process Water Pond Closure

i) By **15 January 2008**, the Discharger shall submit a Construction Quality Assurance (CQA) Report per Title 27 Section 20324. This report shall also include material specification (engineering properties) required to meet Title 27 specification for a foundation layer and vegetative cover. The report must also include an analysis by a certified Agronomist that the soil used as a vegetative cover can and will support plant growth. The source of the material shall be identified.

ii) By **1 July 2008**, the Discharger shall complete the construction of the dewatering phase of the closure of the PWP. Submit by **1 August 2008**, the Discharger shall submit a Construction Completion Report that meets the documentation requirements of Title 27 Section 20324(d)(1)(C).

iii) By **1 October 2018**, the Discharger shall complete closure of the PWP, which includes closing the evaporation pond, final grading of the cover of the PWP, installation of drainage control and slope protection and erosion control measures on the final cover. Submit by **31 December 2018,** the Discharger shall submit a Final Closure Documentation Report per Title 27 Section 20324(d)(1)(C).

7. In accordance with California Business and Professions Code Sections 6735, 7835, and 7835.1, engineering and geologic evaluations and judgments shall be performed by or under the direction of registered professionals competent and proficient in the fields pertinent to the required activities. All technical reports specified herein that contain workplans for, that describe the conduct of investigations and studies, or that contain technical conclusions and recommendations concerning engineering and geology shall be prepared by or under the direction of appropriately qualified professional(s), even if not explicitly stated. Each technical report submitted by the Discharger shall contain the

professional's signature and stamp of the seal.

8. In the event of any change in control or ownership of the facility, the Discharger must notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be immediately forwarded to this office. To assume operation as Discharger under this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of the Order. The request must contain the requesting entity's full legal name, the state of incorporation if a corporation, the name and address and telephone number of the persons responsible for contact with the Regional Water Board, and a statement. The statement shall comply with the signatory paragraph of the Standard Provisions and state that the new owner or operator assumes full responsibility for compliance with this Order. Failure to submit the request shall be considered a discharge without requirements, a violation of the California Water Code. Transfer shall be approved or disapproved by the Executive.

9. For the purpose of resolving any disputes arising from or related to the California Water Code, any regulations promulgated thereunder, these WDRs, or any other orders governing this site, the Discharger, its parents and subsidiaries, and their respective past, present, and future officers, directors, employees, agents, shareholders, predecessors, successors, assigns, and affiliated entities, consent to jurisdiction of the Courts of the State of California.

10. The Regional Water Board will review this Order periodically and may revise requirements when necessary.

I, Pamela C. Creedon, Executive Officer, do hereby certify the foregoing is a full, true and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region on _____________.

PAMELA C. CREEDON, Executive Officer